CLAIMS

1. An interleaver comprising:

a beam separator/recombiner configured to separate at least one component beam into first and second approximately equal amplitude subcomponents thereof, each component beam having a defined polarization direction, the beam separator/recombiner also being configured to subsequently recombine the separated first and second subcomponents back into components;

a first reflector configured to direct the first subcomponent from the beam separator/recombiner back into the beam separator/recombiner; and

a second reflector configured to direct the second subcomponent from the beam separator/recombiner back into the beam separator/recombiner.

2. The interleaver as recited in claim 1, further comprising an input beam separator configured to separate an input beam into two component beams in a manner which defines a polarization direction of each component beam.

3. The interleaver as recited in claim 1, further comprising an input beam separator configured to separate an input beam into two component beams in a manner which defines a polarization direction of each component beam, the input beam separator comprising a polarization beam separator.

4. The interleaver as recited in claim 1, wherein the beam separator/recombiner is configured to separate two component beams, each component beam being separated into first and second approximately equal amplitude subcomponents thereof.

5. The interleaver as recited in claim 1, wherein the beam separater/recombiner comprises at least one polarization beam splitter.

6. The interleaver as recited in claim 1, wherein the first reflector comprises a Gires-Tournois reflective resonator.

7. The interleaver as recited in claim 1, wherein the second reflector comprises a Gires-Tournois reflective resonator.

8. The interleaver as recited in claim 1, wherein:

the first reflector comprises a Gires-Tournois reflective resonator having a front surface reflectivity of approximately zero and having a rear surface reflectivity of approximately 100%;

the second reflector comprises a Gires-Tournois reflective resonator having a front surface reflectivity of greater than zero and having a rear surface reflectivity of approximately 100%; and

the first reflector provides a phase delay of approximately one half of the phase delay provided by the second reflector.

9. The interleaver as recited in claim 1, further comprising:

a half-wave waveplate configured to orient each component beam such that the beam separator/combiner separates each component beam into two subcomponent beams having approximately equal amplitude; and

a quarter-wave waveplate configured to orient each subcomponent beam such that the subcomponent beams recombine in the beam separator/recombiner and such that the subcomponent beams do not interfer substantially with the component beam(s) prior to the component beam(s) being separated by the separator/recombiner.

10. The interleaver as recited in claim 1, further comprising:

an intermediate beam separator configured to separate each component beam from the beam separator/recombiner into two subcomponent beams, the intermediate beam separator comprising a half-wave waveplate and a polarization beam displacer.

11. The interleaver as recited in claim 1, further comprising:

an output beam recombiner configured to combine subcomponent beams into component beams, the output beam recombiner comprising a half-wave waveplate and a polarization beam displacer.

12. The interleaver as recited in claim 1, further comprising at least one dispersion mitigating stage, each dispersion mitigating stage comprising:

a dispersion mitigating Gire-Tournois resonator; and

a polarization beam splitter configured to transmit light to a dispersion mitigating Gires-Tournois resonator and configured to reflect light from the dispersion mitigating Gires-Tournois resonator away from light input to the polarization beam splitter such that the light reflected away from light input to the polarization beam splitter does not interfere with the light input to the polarization beam splitter.

13. The interleaver as recited in claim 1, further comprising at least one dispersion mitigation stage, each dispersion mitigating stage comprising:

a dispersion mitigating Gire-Tournois resonator;

a polarization beam splitter configured to transmit light to a dispersion mitigating Gires-Tournois resonator and configured to reflect light from the dispersion mitigating Gires-Tournois resonator away from light input to the polarization beam splitter such that the light reflected away from light input to the polarization beam splitter does not interfere with light input to the polarization beam splitter; and

a half-wave waveplate and a quarter-wave waveplate configured to orient light when the light passes through the dispersion mitigating stage of the Gires-Tournois resonator such that the light does not interfere with light input to the polarization beam splitter.

14. The interleaver as recited in claim 1, further comprising at least one dispersion mitigation stage, each dispersion mitigating stage comprising:

a dispersion mitigating Gire-Tournois resonator;

a polarization beam splitter configured to transmit light to a dispersion mitigating Gires-Tournois resonator and configured to reflect light from the dispersion mitigating Gires-Tournois resonator away from light input to the polarization beam splitter such that the light reflected away from light input to the polarization beam splitter does not interfere with light input to the polarization beam splitter;

a quarter-wave waveplate configured to orient light reflected from each dispersion mitigating Gires-Tournois resonator such that the light does not interfere with light input to the polarization beam splitter; and

a half-wave waveplate and an output polarization beam displacer for combining subcomponent beams from last dispersion mitigation stage into odd and even channel components.

15. A method for interleaving, the method comprising:

separating at least one component beam into first and second approximately equal amplitude subcomponents thereof, each component beam having a defined polarization direction;

directing the first subcomponent from a beam separator/recombiner back into the beam separator/recombiner;

directing the second subcomponent from the beam separator/recombiner back into the beam separator/recombiner; and

recombining the separated first and second subcomponents back into components.

16. The method as recited in claim 15, further comprising separating an input beam into two component beams in a manner which defines a polarization direction of each component beam.

17. The method as recited in claim 15, wherein separating at least one component beam comprises separating at least one component beam using at least one polarization beam splitter.

18. The method as recited in claim 15, wherein:

directing the first subcomponent compromises directing the first subcomponent using a first Gires-Tournois reflective resonator; and

directing the second subcomponent comprises directing the second subcomponent using a Gires-Tournois reflective resonator.

19. The method as recited in claim 18, wherein:

the first Gires-Tournois reflective resonator has a front surface reflectivity of approximately zero and has a rear surface reflectivity of approximately 100%;

the second reflector comprises a Gires-Tournois reflective resonator has a front surface reflectivity of greater than zero and having a rear surface reflectivity of approximately 100; and

the first Gires-Tournois reflector provides a phase delay of approximately one half of the phase delay provided by the second Gires-Tournois reflector.

20. A device for mitigating dispersion, the device comprising:

a Gires-Tournois resonator; and

a polarization selection element configured to direct light to the Gires-Tournois resonator and configured to reflect light from the Gires-Tournois resonator away from light input to the polarization selection element.

21. The device as recited in claim 20, wherein:

the polarization selection element comprises a polarization beam splitter; and

a quarter-wave waveplate configured to cause the polarization beam splitter to reflect light away from the light input to the polarization beam splitter.

22. An interleaver comprising:

a first beam separator/recombiner configured to separate at least one component beam into first and second approximately equal amplitude subcomponents thereof, each component

beam having a defined polarization direction, the first beam separator/recombiner also being configured to subsequently recombine the separated first and second subcomponents back into components;

a first reflector configured to direct the first subcomponent from the first beam separator/recombiner back into the first beam separator/recombiner;

a second reflector configured to direct the second subcomponent from the first beam separator/recombiner back into the first beam separator/recombiner;

a second beam separator/recombiner;

a third reflector configured to direct recombined first and second subcomponents from the first beam separator/recombiner to the second beam separator/recombiner;

a fourth reflector configured to direct light from the second beam separator/recombiner back into the second beam separator/recombiner; and

wherein the second beam separator/recombiner is configured to transmit light from the third reflector to the fourth reflector and to reflect light from the fourth reflector out of the second separator/recombiner.

23. The interleaver as recited in claim 22, wherein the first beam separator/recombiner and the second beam separator/recombiner comprise a common polarization beam splitter.

24. The interleaver as recited in claim 22, wherein the first beam separator/recombiner and the second beam separator/recombiner comprise two separate polarization beam splitters.

25. The interleaver as recited in claim 22, wherein:

the first reflector comprises a Gires-Tournois resonator;

the second reflector comprises a Gires-Tournois resonator;

the third reflector comprises a prism; and

the fourth reflector comprises a Gires-Tournois resonator.

26. The interleaver as recited in claim 22, further comprising a fifth reflector configured to reflect light from the second beam separator/recombiner back through the second beam separator/recombiner.

27. The interleaver as recited in claim 26, wherein the fifth reflector comprises a Gires-Tornois resonator.